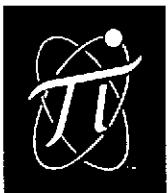
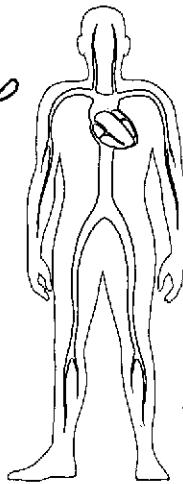


NASA CR-134380



TECHNOLOGY INCORPORATED LIFE SCIENCES DIVISION

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LABORATORY SUPPORT Final Report, 1 May
1972 - 30 Jun. 1974 (Technology, Inc.,
Houston, Tex.) 65 p HC \$6.25 CSCL 06H

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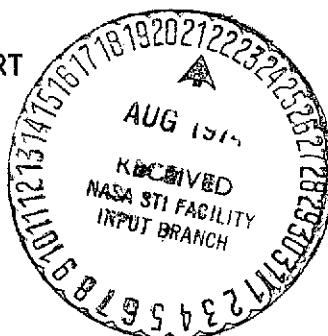
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FINAL REPORT

Period 1 May 1972 through 30 June 1974

Contract NAS 9-12926

SKYLAB FOOD SYSTEM LABORATORY SUPPORT



TECHNOLOGY INCORPORATED
LIFE SCIENCES DIVISION
HOUSTON, TEXAS

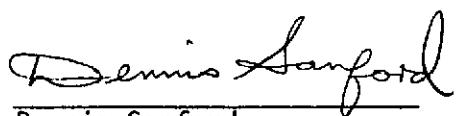
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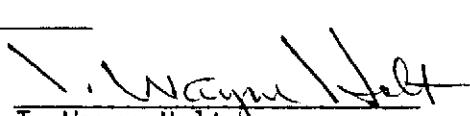
SKYLAB FOOD SYSTEM LABORATORY SUPPORT

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1.0 Introduction

This final report is submitted in compliance with Contractual Agreement NAS 9-12926, "Skylab Food System Laboratory Support", and covers the period 1 May 1972 through 30 June 1974. Monthly Progress Reports have been submitted during this period. This Final Report includes a summary of the support activities performed and reported in the Monthly Progress Reports. All activities under this contract have been completed.

2.0 Work Accomplished

2.1 Qualification Test Support

The Qualification Test Program was conducted on the Skylab Food System to verify Crew Compartment Fit and Function (CCFF) and to certify compliance of the food system with contract number NAS 9-11164, "Skylab Food System."

The Test Program included humidity, shock, vibration, altitude, temperature, pressure, atmospheric compatibility, and functional tests. Observation and verification of contractual compliance were accomplished by attending the Qual Test Readiness Review meetings, serving as a Test Engineer at both contractor facilities and at JSC facilities, and reviewing reports of these tests. A Delta Qual Test Program was designed and completed as a result of hardware changes after the completion of the Qual Test Program. A report of this Delta Qual Test was included in the March, 1973 Monthly Progress Report.

2.2 Design Certification Review Report

A formal report was written to fulfill one of the requirements of the Skylab Design Certification Review (DCR). For this report pictures were taken to document current food system designs, viewgraphs were made for review presentations, and corrected editions of the initial report drafts were prepared. Motion pictures of food handling and preparation procedures were also made as part of this documentation. A final draft of this report was published as MSC-07288, "Skylab Food System DCR."

2.3 Open Item Status Log

Weekly Skylab Food System Open Item Status and Management Coordination Group Meetings were held due to the complexities and the number of activities involved in association with the design and production of the Skylab Food System.

Assigned activities were discussed and problems reviewed by both NASA and contractor personnel at these meetings. An Open Action Item Log was maintained and minutes of the meetings, Requests for Engineering Change Proposals (RECP), and Contract Change Actions (CCA) were prepared and submitted. Also support of the Bioengineering Systems Division at Level II Configuration Change Boards was provided.

2.4 SMEAT IDR, DR, and FIAR Tracking System

The Skylab Medical Experiments Altitude Test (SMEAT), revealed several problem areas in the food system as noted in Intermediate

Discrepancy Reports (IDR), Discrepancy Reports (DR), and Failure Investigation Action Reports (FIAR). A log of these IDR's, DR's, and FIAR's was maintained and dispositions prepared as changes were made or analyses completed. These dispositions were then presented to Quality Control for approval and for closure of the reports. A copy of this report is shown as Appendix A.

2.5 Engrave Skylab Utensils

As a result of design reviews, a request was made for an identification method of individualized food and accessory items. One of these items, the Skylab OWS utensils, was engraved with the crewman's designation. Three sets each were engraved with "CDR", "SPT", and "PLT" and were shipped to KSC with three blank sets for flight stowage.

2.6 Coordination of KSC Activities for Skylab Food System

Facilities were constructed at KSC to provide bonded storage for food at both -10°F and $+40^{\circ}\text{F}$ in order to comply with Skylab food preflight storage requirements.

Handling procedures were written to cover shipment from Whirlpool of the flight food units, receiving at KSC, and ground handling. These procedures were coordinated with KSC personnel and then included in the KSC final Test Checkout Procedures. Adherence to these procedures was verified during the shipment of the flight food in May, 1973.

2.7 Food Item Matrix

In order to consolidate information on Skylab food items, a Food Item Information Matrix was constructed. This matrix included part numbers, serial numbers, serving size, preparation information, mineral, calorie, and protein content, and manufacturer's data. This matrix was included in the console handbooks of the Mission Operation Control Room (MOCR) and the Staff Support Room (SSR). A copy of this matrix and an explanation of items in the matrix are included as Appendix B.

2.8 Food System Accessory Hardware Matrix

In an effort to consolidate information on accessory hardware, a Food System Accessory Hardware Matrix was developed. This matrix included stowage list numbers, part numbers, stowage locations, weights, and use sequence information. This matrix was also included in the MOCR and SSR console handbooks. A copy of this matrix and a definition of the column items are included as Appendix C.

2.9 Study of Impact of Skylab Menus on Stowage Configuration

A study of the impact of the Skylab menus on the stowage configuration to be used in the Skylab OWS was made. Preliminary studies were begun using non-finalized menus but were not completed until final menus were received. When the flight menus were received, a Configuration Change Board Directive (CCBD) was prepared and submitted. Approval of this CCBD provided a method of maintaining configuration control of the menus. Calculations were then made

to determine the space required to stow the menus. Appendix D shows that all but 21 large canisters and 18 small canisters were required to stow the planned menus. These calculations showed that space was not available for stowage of the quantities of overage food as required by the M070 experiments. Approval was obtained to launch food in two standard stowage lockers (W775 and W776) and in the chiller. These spaces were to be launched empty and to be used for in-flight food handling. With this extra stowage space, sufficient quantities of overage would be available to satisfy the M070 experiment requirements. Appendix E shows the items launched as overage and that these items would provide 414 calories per man per day.

2.10 Skylab Stowage and Orientation List

A stowage and orientation list was constructed as a result of the stowage impact studies. This orientation list had to consider menu use sequences, menu items, and hardware stowage restrictions. These restrictions are given in detail in Appendix F along with examples of the list as it was constructed. The list is approximately 450 pages in length and was used by Whirlpool Corporation to assemble the food in the restraint assemblies for flight stowage. A copy of this list is available in the Medical Data Center Library and Archive of the Biomedical Research Division, DB, Johnson Space Center. When this list was completed, a schedule of restraint assembly transfers was forwarded to the Crew Procedures Division for inclusion in the

crewman's log books. This schedule is shown in Appendix G.

2.11 Overage Food Launch Stowage Design

As stated before, the impact study showed that sufficient space had not been allocated for stowage of overage food items. A fit-check was made and it was determined that 12 small canisters could be stowed in a standard storage locker. Since the chiller was the same size as the freezer lockers, a freezer restraint assembly could be used to launch stow 10 canisters of ambient food in the chiller. A CCBD was prepared, processed, and approved to stow ambient food in Lockers W775, W776, and the wardroom chiller. Since a frozen food restraint assembly was being used, it was flight qualified by similarity. The design for the two standard lockers consisted of a continuous set of KEL-F sleeves (similar to a bullet-belt design) and a Beta-cloth overbag. With this design, flight qualification was restricted to vibration testing of the small canister configuration. A Delta Qualification Test Plan was prepared, the test was completed, and flight approval of this design was obtained. The KEL-F sleeves and Beta-cloth bags were prepared and forwarded to Whirlpool Corporation for flight packaging.

2.12 Temporary Can Covers

In-flight, temporary can covers were found to fulfill a request by one of the crewmen. It was determined that both these can covers and the fecal dye marker's could be launch stowed in the dispenser module in the booklet designed to hold the Polyethylene Glycol capsules. A Preliminary Stowage List Change Notice (PSLCN) was

submitted and approved. A preliminary design was forwarded to Whirlpool Corporation and was implemented in the flight dispenser module.

2.13 Provide Food for Mini-Sims

Coordination of receipt and delivery of Flight Food to the Crew Procedures Division for use in crew training simulations was provided. A total of thirty-five (35) days of food was provided in flight packages using flight menus.

2.14 Modification of Food Trays

The letter "P" was added to the tops of the flight and flight back-up food trays to designate the cavity to be used for puddings. This was the solution to the SMEAT problem of enlargement of small cavities and loss of friction fit. This was due to a slightly larger diameter on the pudding cans when compared to the wafer cans.

2.15 Skylab Food Thermal Storage Tests

A thermal storage test was conducted at JSC as a result of the extremely high temperatures of the OWS during the period following launch of the OWS. This test was conducted on twenty (20) samples each of sixty (60) non-frozen items and followed the temperature profile of the OWS. After tests and comparison to control samples, all items were found to be safe for consumption.

2.16 OWS Food Inventory System

A ground-based, OWS on-board inventory system was developed to track usage of the excess OWS food. Inputs for this inventory came

from the Skylab menus, the stowage list, and the Evening Status reports from each mission. The form used to report daily changes in overage is shown as Appendix H. This form was also used to track usage of mineral supplements and salt packets. The net results of these changes were reported to the Operational Systems and Planning Branch on a weekly basis using the form shown in Appendix I. At the end of the SL/2 mission, the net change in calories was an addition of 1795 calories to the overage available as shown in Appendix J.

2.17 Review of Daily Transcripts

The Dump Tape and Air-to-Ground Tape transcripts were reviewed on a regular basis during all three missions to determine any problems that might occur within the food system and to gain knowledge of the functional aspects of the food system. A log of these transcripts was maintained and edited copies were prepared for use by the Operational Systems and Planning Branch.

2.18 SL/III Mission Extension Planning

Support of the extension of the SL/III mission to 59 days was provided using information from the OWS excess food inventory. It was determined that by launching 13 items in the CM and by using food available on the OWS, three days of food could be provided with no impact to the M070 series of experiments. These items were shipped to KSC for flight stowage. A list of these items is shown in Appendix K. The location of the other items required for the

extension is shown in Appendix L. This list was forwarded to the Crew Procedures Branch for inclusion in the crewmen's log books.

2.19 SL/IV Mission Extension Planning

Plans to extend the SL/IV mission were made using the information provided by the OWS excess food inventory. Launch requirement calculations were made for 5-day, 10-day, 14-day, and 28-day extensions. An analysis of quantities available on the OWS showed that a 28-day extension could be supported by providing new menus for the extra 28 days. For these menus approximately half of the calories were provided by Skylab food and half by high-caloric density food bars. A stowage study was conducted using weight and volume data for these menus. Mock-up launch configurations were assembled and fit-checks made. A launch design was approved employing beta-cloth bags strapped to the tops of the lockers under the crewmen's couches. The food packages were prepared for flight use, shipped to KSC, and repacked in launch stowage configurations. A list of the food items launched on SL/IV is shown in Appendix M.

2.20 SL/IV Overage Inventory System

The amount of food remaining on board the OWS became one of the prime factors in the extension of the SL/IV mission. The quantities of food items and number of calories remaining were tracked on a daily basis and reported to the Director of the Life Sciences Division, JSC, on a weekly basis. The chart in Appendix N shows

the form used to report the weekly inventory status. It shows quantities of food available at the beginning of SL/IV, quantities required to fulfill menu requirements thru the end of the mission, quantities remaining as of the reporting date, and excesses/short-ages of food. Calories remaining onboard the OWS were also tracked and reported on a weekly basis as shown in Appendix O. As shown, the projection indicated that excess food items would be left over at the end of the 84 day mission. These items are shown in Appendix P and were reported in the final SL/IV Mission Report.

APPENDIX A

IDR-DR-FIAR STATUS LOG

SMEAT

IDR - DR - FIAR STATUS LOG

FOOD SYSTEM

9/28/72

Item	Day	Problem/Comment	IDR	DR	FIAR	STATUS		Remarks
						Open	Closed	
1		Spaghetti bag broke open - Bobko	1S260142	77230005	H	7-24	8-8	
2	4	Bread crumbs from biscuits	1S260179		H-EC-0196	7-29	8-8	
3	4	Spillage	1S260181		H-EC-0194	7-29	8-8	
4	4	Leak in beverage valve or seam	1S260182		H-EC-0195	7-29	8-8	
5	4	Leak in beverage valve	1S260183		H-EC-0195	7-29	8-8	
6	4	Leak in seam; spillage; coffee valve leaked	1S260196		H-EC-0196	7-29	8-8	
7	5	Stewed tomatoes leaked	1S260200		H-EC-0194	7-30	8-8	
8	5	Refrigerator in Bldg 4	1S260204			7-30	8-8	Not a system discrepancy
9	5	No cream in coffee	1S260205			7-30	8-8	
10	7	SPT has pebble in beans	1S260236		H-EC-0198	8-1	8-8	
11	7	SPT and PLT dye marker broke	1S260245		H-EC-0100	8-1	8-8	
12	7	Biscuit cans are smaller than other cans	1S260246		H-EC-0199	8-1	8-8	
13	8	Seam in mashed potatoes failed	1S260253		H-EC-0202	8-2	8-8	
14	9	Cross brace makes removal of items difficult	1S260282			8-3	8-8	Incorrectly written. Reassigned to IMSS
15	9	Juice spillage on filet opening	1S260284			8-3	8-8	
16	9	Food trays do not provide friction fit	1S260306		H-EC-0203	8-3		Cans to be checked
17	9	Coffee missing - PLT; biscuit missing	1S260299			8-3	8-8	
18	11	Eating utensil too small	1S260312			8-5	8-8	
19		Ring pull broke on jam - wet run		12231103	H-EC-0189	7-11	8-8	Wet run comment
20	15	Drink valve not operative - SPT	1S260344			8-9	8-26	Returned to WPC for ar
21	15	SPT choked on hard candy	1S260345			8-9	8-26	

Item	Day	Problem/Comment	IDR	DR	FIAR	STATUS		Remarks
						Open	Closed	
22	3	Label on corn and crew checklist do not agree on oz. of water	1S260168			7-28	9-26	
23	19	Drink dispenser will not empty completely	1S260381		H-EC-0206	8-13	9-26	
24	23	SPT had reaction from pea soup	1S260397		H-EC-0207	8-17		
25	27	Grape drink package failed (seams)	1S260449	12231402		8-21	9-26	
26	30	Drink container valve failed - cocoa drink	1S260473	15230022		8-24	9-28	*
27	30	Drink container valve failed - grape drink	1S260474	15230026		8-24	9-28	*
28	33	"O"-ring failure on coffee	1S260508	15230021		8-27	9-28	*
29	39	Bread smashed and no powdered milk in corn flakes	1S260549			9-2	9-26	
30	39	No valve on grape drink	1S260551	15230020		9-2	9-28	*
31	41	Crew cuts fingers removing plastic cap on beverages	1S260563			9-4	9-26	
32	41	Cream style corn package leaked	1S260564	15230023		9-4	9-28	*
33	41	Beverage container would not fit over water dispenser	1S260565	15230025		9-4	9-28	*
34	42	Orange drink valve failed to function properly	1S260574	15230024		9-5	9-28	*
35	45	SPT lemonade beverage container was empty	1S260603	15230027		9-8	9-28	*
36	46	Orange drink did not have loading spring behind valve	1S260605	15230019		9-9	9-28	*
37	50	Coffee drink had "O" ring missing	1S260633	15230028		9-13	9-28	*

*Dispositioned to WPC
for analysis per DR's listed.

APPENDIX B
FOOD ITEM INFORMATION MATRIX

Food Item Information Matrix

This matrix outlines and defines data relative to the individual food items used to make up flight crew menus. The matrix consists of each food item and a series of information columns relative to each. A definition of each column is given below.

Food Type: This defines the configuration of the food inside the container. Abbreviations used are defined as follows:

R - Rehydratable Food

T - Thermostabilized Food Item

W - Wafer Food Package

B - Beverage Item

F - Frozen Item

R l - Rehydratable Item in Spoon Bowl Pouch

Item Number - Number used to sequence food item in manufacturing.

Part Number - Number of food item as appears in the food system indentured parts list.

Process Specification No. - Number of document used to manufacture the food item.

Serving Size - Grams of product in individual food item. This does not include water weight used on rehydratable or beverage items.

Can Size - The diameter of the can in which the food item is contained.

401 - Four and one sixteenth inch diameter

208 - Two and one half inch

Bev - Beverage package

Membrane - A membrane is contained under the can pull tab lid panel on items marked "yes".

Wafer Pull Tab - A wafer pull tab is contained inside can on items marked "yes".

Wafer Membrane - A membrane is contained under the can pull tab on items marked "yes".

Reconstitution Wafer Quantity - Quantity of water which must be added to food item prior to consumption.

Reconstitution Time - Time required from addition of water prior to consumption.

Add Water - Defines whether hot or cold water is added to food item.

Moisture Content - Amount of moisture in each food item.

Homogeneous - Items marked "yes" contain a homogeneous food mixture and residuals can be weighed on the specimen mass measuring device.

Items marked "no" require crew to all or none.

Vendor - Manufacturers who prepare the food in accordance with the process specification.

Potassium - Defines the amount of potassium in the food item.

Calcium - Defines the amount of calcium in the food item.

Phosphorus - Defines the amount of phosphorus in the food item.

Sodium - Defines the amount of sodium in the food item.

Magnesium - Defines the amount of magnesium in the food item.

Calories - The number of calories in each food item.

Kneading - Items marked "yes" or "shake" require kneading.

Can be Prepared at Previous Meal - Self explanatory

Can be Chilled After Opening or After Preparing - Self explanatory

Can be Heated After Opening or After Preparing Items - Self explanatory

Package Weight - Weight of package less food item.

Utensils Used - Recommended utensils, actual use is crew option.

SKYLAB FOOD SYSTEM INFORMATION MATRIX

MAY 1, 1973

FOOD TYPE	ITEM NUMBER	PART NO 20-022-X-X	PROCESS SPEC. NO. 1A-00044	SIZE IN CANS	CAN SIZE (DIA/HEIGHT)	MEMBRANE	WATER PULL TAB	WATER MEMBRANE	RECONSTITUTION QUALITY (2)	RECONSTITUTION TIME	ADD WATER	NUTRITIONAL WATER (2)	HOMOGENEUS	Vendor *	POTASSIUM mg	CALCIUM mg	PHOSPHORUS mg	SODIUM mg	MAGNESIUM mg	PROTEIN IN CANS	CALORIES	REQUIRES MEAL	CAN BE PREPARED AT PREVIOUS MEAL	CAN BE CHILLED AFTER OPENING OR CAN BE HEATED AFTER OPENING	PACKAGE WEIGHT (2)	UTENSILS (2)			
FOOD TYPE - VEGETABLES *																													
ASPARAGUS	R	22	22-2	416	8.4	401	-	-	-	2	2-3	HOT	-	YES	WPC	173	21	59	210	12	2.9	37	-	-	-	YES	39.3	SPoon/ FORK	
GREEN BEANS	R	73	29-2	475	20.5	401	-	-	-	3	2-5	HOT	-	NO	WPC	240	76	78	513	20	2.9	89	-	-	-	YES	39.3	SPoon/ FORK	
MASHED POTATOES	R	132	32-2	435	36.0	401	-	-	-	4	2-3	HOT	-	YES	WPC	263	54	76	385	17	3.4	200	YES	-	-	YES	39.3	SPoon/ FORK	
GERMAN POTATO SALAD	R	149	49-2	452	33.0	401	-	-	-	3	5-20	HOT	-	NO	WPC	211	19	69	638	17	6.8	176	-	-	-	YES	39.3	SPoon/ FORK	
CREAMED PEAS	R	56	56-2	459	34.0	401	-	-	-	3 1/2	10-20	HOT	-	NO	WPC	197	56	111	802	22	5.6	154	-	-	-	YES	39.3	SPoon/ FORK	
MASHED SWEET POTATOES	R	61	61-2	464	48.0	401	-	-	-	2	3-15	HOT	-	YES	WPC	566	41	96	575	28	2.8	216	YES	-	-	YES	39.3	SPoon/ FORK	
STEWED TOMATOES	T	64	64-2	467	190.0	401	YES	-	-	-	-	-	5.7	NO	SW	443	80	35	568	23	1.8	65	-	YES	-	YES	27.9	SPoon/ FORK	
CREAM STYLE CORN	R (1)	65	65-2	404	37.5	401	-	-	-	4 1/2	10	HOT	-	NO	WPC	252	4	89	418	32	3.4	159	-	-	-	YES	42.3	SPoon/ FORK	
FOOD TYPE - FRUITS AND DESSERTS																													
BUTTERSCOTCH PUDDING	T	2	02-2	401	144.2	208	-	-	-	-	-	-	3.2	YES	HW	156	132	97	291	12	3.2	205	-	-	YES	-	17.5	SPoon	
LEMON PUDDING	T	44	04-2	414	152.3	208	-	-	-	-	-	-	3.6	YES	DM	75	8	1	150	1	0	200	-	-	YES	-	17.9	SPoon	
DRIED APRICOTS	W	7	07-2	408	62.0	208	-	-	YES	-	-	-	0.4	YES	M	860	38	65	76	32	2.2	183	-	-	-	-	16.0	-	
BUTTER COOKIES	W	76	78-2	519	27.0	208	-	YES	YES	-	-	-	-	YES	GFE	140	4	12	5	2	1.2	144	-	-	-	-	18.0	-	
STRAWBERRIES	R	27	27-2	418	23.4	401	-	-	-	1 1/2	5-8	-	-	NO	WPC	160	22	21	3	14	0.6	95	-	-	YES	-	39.3	SPoon	
VANILLA WAFERS	W	28	28-2	432	23.1	208	-	YES	YES	-	-	-	-	YES	KE	21	4	26	31	4	1.5	114	-	-	-	-	18.0	-	
PINEAPPLE	T	38	58-2	441	200.0	401	YES	-	-	-	-	-	5.3	NO	SW	183	22	8	21	29	0	148	-	-	YES	-	27.8	-	
APPLESAUCE	T	43	43-2	446	195.0	401	YES	-	-	-	-	-	5.1	YES	SW	139	6	17	10	5	0	154	-	-	YES	-	27.8	-	
PEACHES	T	46	46-2	419	200.0	401	YES	-	-	-	-	-	5.2	NO	SW	208	7	26	27	12	0	163	-	-	YES	-	27.8	-	
PEARS	T	47	47-2	450	200.0	401	YES	-	-	-	-	-	4.4	NO	SW	152	11	12	12	6	0	167	-	-	YES	-	27.8	-	
PEACH AMBROSIA W PECANS	R	69	69-2	471	36.1	401	-	-	-	2	5-15	-	-	NO	WPC	225	18	58	15	30	2.1	204	-	-	YES	-	39.3	SPoon	
FOOD TYPE - BEVERAGE **																													
LEMONADE	B	N 23	23-2	423	21.3	BEV.	-	-	-	7 1/2	1	COLD	-	YES	W	5	12	5	29	0	0	84	SHAKE	YES	YES	-	-	-	-
GRAPE DRINK	B	142	42-2	445	31.5	BEV.	-	-	-	7 1/2	1	COLD	-	YES	GF	4	3	1	14	0	0	123	SHAKE	YES	YES	-	-	-	-
COCOA	B	158	58-2	461	54.6	BEV.	-	-	-	6 1/2	1	HOT	-	YES	WPC	419	68	161	189	34	3.9	259	SHAKE	YES	-	-	-	-	-
ORANGE DRINK	B	160	60-2	463	31.5	BEV.	-	-	-	7 1/2	1	COLD	-	YES	GF	85	79	133	87	1	0	123	SHAKE	YES	YES	-	-	-	-
COFFEE	B	162	62-2	465	2.4	BEV.	-	-	-	8	1	HOT	-	YES	WPC	103	5	9	4	11	0.5	11	SHAKE	YES	-	-	-	-	-
TEA W LEMON & SUGAR	B	166	66-2	468	20.0	BEV.	-	-	-	7 1/2	1	COLD***	-	YES	NE	49	1	2	7	2	0	80	SHAKE	YES	YES	-	-	-	-
CHERRY DRINK	B	178	77-2	518	36.85	BEV.	-	-	-	7 1/2	1	COLD	-	YES	GFE	1	2	1	12	1	-	143	SHAKE	YES	YES	-	-	-	-
APPLE DRINK	B	177	76-2	517	36.85	BEV.	-	-	-	7 1/2	1	COLD	-	YES	WPC	92	64	77	89	1	0	126	SHAKE	YES	YES	-	-	-	-
STRAWBERRY DRINK	B	180	80-2	478	31.5	BEV.	-	-	-	7 1/2	1	COLD	-	YES	WPC	410	95	125	2	0	170	SHAKE	YES	YES	-	-	-	-	
GRAPEFRUIT DRINK	B	179	79-2	477	33.9	BEV.	-	-	-	7 1/2	1	COLD	-	YES	WPC	797	456	406	139	14.8	239	SHAKE	YES	YES	-	-	-	-	
CHOCOLATE INSTANT BREAKFAST	B	150	50-2	453	55.8	BEV.	-	-	-	6	1	COLD	0.1	YES	NE	797	456	406	139	14.8	239	SHAKE	YES	YES	-	-	-	-	

* CAN BE PREPARED AT PREVIOUS MEAL. ONLY IF COLD WATER IS USED, AND THEN HEATED AT MEAL
 ** ALL BEVERAGES CAN BE RECONSTITUTED WITH HOT WATER IF THEY ARE CONSUMED IMMEDIATELY OR IF THEY ARE PLACED IN THE CHILLER
 *** CREWMAN'S PREFERENCE

① REHYDRATABLE SPOONBOWL PACKAGE

★ WPC - WHIRLPOOL CORP
 SW - SWIFT
 HW - HUNT WESSON
 DM - DEL MONTE
 M - MARIANA
 GFE - GOVT FURNISHED EQUIP.
 GF - GENERAL FOODS
 NE - NESTLES

② PACKAGE WEIGHT = WEIGHT OF CANS - LID PANEL + PACKAGING + PLASTIC LID + 3 TISSUES

20 < FOLDOUT FRAME

9

SKYLAB FOOD SYSTEM INFORMATION MATRIX

MAY

FOOD TYPE	ITEM NUMBER	PART NO. 022-XX-2	PROCESSED SPEC. NO. 24-004X	SERVING SIZE IN GRAMS	CAN SIZE (DIAMETER)	MEMBRANE	WAFFER PULL TAB	WAFFER ALUMINUM	RECONSTITUTION QUANTITY (OZ)	RECONSTITUTION TIME (MIN)	ADD WATER	NUTRITIONAL WATER (OZ)	HOMOGENEOUS	VENDEUR *	POTASSIUM (mg)	CALCIUM (mg)	PHOSPHORUS (mg)	SODIUM (mg)	MAGNESIUM (mg)	PROTEIN IN CHAINS	CALORIES	REQUIRES REHEATING	CAN BE PREPARED AT PREVIOUS MEAL	CAN BE CHILLED OR FROZEN AFTER OPENING	CAN BE KEPT AFTER OPENING	PACKAGE (2)	UNITS (S)	
FOOD TYPE - BREAKFAST ENTREES																												
SAUSAGE PATTIES	R	13	13-2	419	30.0	401	-	-	-	1 1/2	3-5	HOT	-	YES	SW	227	5	124	416	16	16.4	197	YES	-	-	YES	39.3	FORK
SCRAMBLED EGGS	R	16	16-2	422	34.5	401	-	-	-	3	3-5	HOT	-	YES	E	218	132	200	459	17	11.6	235	YES	-	-	YES	39.3	FORK
BACON WAFERS	W	17	17-2	420	28.8	208	-	-	-	-	-	-	0.1	YES	SW	204	7	117	978	13	13.8	155	-	-	-	-	21.0	-
RICE KRISPIES	R(1)	54	54-2	457	34.0	401	-	-	-	3 1/2	-	COLD	-	NO	WPC	213	136	137	265	22	5.3	145	-	-	YES	-	42.3	SPoon
SUGAR COATED CORN FLAKES	R(1)	15	15-2	415	40.0	401	-	-	-	3	0	COLD	-	NO	WPC	191	122	108	300	34	4.9	168	-	-	YES	-	42.3	SPoon
FOOD TYPE - LUNCHEON ENTREES																												
TUNA SALAD SPREAD	W	3	03-2	402	85.0	208	-	-	-	-	-	-	2.0	NO	SW	175	22	85	562	14	9.7	149	-	-	YES	-	15.7	-
MACARONI & CHEESE	R	74	74-2	474	44.0	401	-	-	-	3 1/2	30-0	HOT	-	NO	WPC	165	114	166	367	25	7.8	213	YES	-	-	YES	39.3	SPoon
SALMON SALAD	R	25	25-2	424	46.7	401	-	-	-	3 1/2	2-5	COLD	-	NO	WPC	307	51	211	646	22	23.5	312	YES	-	YES	-	39.3	SPoon
CHILI W/MEAT	T	34	34-2	437	190.0	401	YES	-	-	-	-	-	4.0	NO	SW	635	52	184	924	44	18.9	473	-	YES	-	YES	27.9	SPoon
SHRIMP COCKTAIL	R	51	51-2	454	18.8	401	-	-	-	2	15-20	COLD	-	NO	WPC	182	65	103	166	32	12.7	93	YES	-	YES	-	39.3	SPoon
CHICKEN & RICE	R	55	55-2	458	47.6	401	-	-	-	4	10	HOT	0.1	NO	WPC	265	30	240	952	25	17.3	23%	YES	-	-	YES	39.3	SPoon
PORK & SCALLOPED POTATOES	R	59	59-2	462	36.8	401	-	-	-	4 1/2	5	HOT	-	NO	WPC	345	53	149	257	24	13.4	187	YES	-	-	YES	39.3	SPoon
BEEF HASH	R	63	63-2	466	48.3	401	-	-	-	4 1/2	5	HOT	-	NO	SW	591	22	282	1362	37	27.0	207	YES	-	-	YES	39.3	-
SLICED DRIED PEEL	W	67	67-2	469	47.0	208	-	-	YES	-	-	-	0.9	YES	SW	251	9	119	2488	14	13.4	86	-	-	-	-	16.0	FORK
SPAGHETTI & MEAT SAUCE	R	72	72-2	473	50.0	401	-	-	-	5	25-30	HOT	0.1	NO	WPC	349	26	178	599	32	21.6	241	YES	-	-	YES	39.3	SPoon
FOOD TYPE - DINNER ENTREES																												
TURKEY & GRAVY	T	40	40-2	443	190.0	401	YES	-	-	-	-	-	4.7	NO	SW	620	13	54	1337	54	38.7	278	-	YES	-	YES	27.9	FORK
HOT DOGS W/TOMATO SAUCE	T	44	44-2	447	200.0	401	YES	-	-	-	-	-	3.8	NO	SW	774	24	225	1820	40	25.7	641	-	YES	-	YES	27.9	SPoon
CHICKEN & GRAVY	R(1)	57	57.2	460	34.2	401	-	-	-	5 1/2	5+	HOT	-	NO	WPC	213	28	222	1138	20	16.5	166	YES	-	-	YES	42.3	SPoon
VEAL & BARBECUE SAUCE	R	71	71.2	472	46.5	401	-	-	-	5	5-18	HOT	-	NO	WPC	582	23	243	589	34	30.5	234	YES	-	-	YES	39.3	FORK
FOOD TYPE - OTHER ITEMS																												
MINTS	W	12	12-2	426	37.1	208	-	-	YES	-	-	-	-	YES	R	1	1	0	1	0	0.0	146	-	-	-	-	16.0	-
CATSUP	W	20	20-2	429	17.0	208	-	-	YES	-	-	-	0.4	YES	PI	102	3	15	223	4	0.3	19	-	-	-	-	17.5	-
FRUIT JAM	W	36	36-2	439	30.0	208	-	-	YES	-	-	-	0.3	NO	WPC	20	4	5	13	3	0	82	-	-	YES	-	20.7	-
MARD CANDY	W	41	41-2	444	61.8	208	-	-	YES	-	-	-	0.1	YES	BR	2	1	0	12	1	0	242	-	-	-	-	16.0	-
PEANUT BUTTER	W	33	33-2	436	40.0	208	-	-	-	-	-	-	-	YES	SW	635	16	156	924	44	11.1	283	-	-	-	-	15.7	-
DRY ROASTED PEANUTS	W	5	05-2	406	45.0	208	-	-	YES	-	-	-	-	YES	FL	363	31	173	479	76	13.4	303	-	-	-	-	16.0	-
PEA SOUP	R(1)	37	37-2	440	49.0	401	-	-	5	10-15	HOT	-	YES	WPC	452	24	180	840	29	7.0	246	YES	-	-	YES	42.3	-	
POTATO SOUP	R(1)	45	45-2	448	48.0	401	-	-	-	4 1/2	10-15	HOT	0.1	YES	WPC	522	12	138	498	18	2.9	231	YES	-	-	YES	42.3	-
TURKEY RICE SOUP	R(1)	53	53-2	456	25.1	401	-	-	-	4 1/2	5	HOT	-	NO	WPC	165	17	153	1041	13	10.7	110	YES	-	-	YES	42.3	-
CHEDDAR CHEESE CRACKERS	W	11	11-2	412	38.3	208	-	YES	YES	-	-	-	-	YES	WPC	63	107	96	477	9	6.2	211	-	-	-	-	18.0	-
BISCUIT	W	48	48-2	451	10.9	208	-	YES	YES	-	-	-	-	YES	KE	14	2	11	93	2	1.0	54	-	-	-	-	18.0	-
WHITE BREAD	T	75	75-2	476	36.5	401	YES	-	-	-	-	-	0.3	YES	N	45	36	35	163	10	3.3	141	-	-	YES	27.8	-	
FOOD TYPE - FROZEN																												
VANILLA ICE CREAM	F	6	06-2	407	130.0	401	YES	-	-	-	-	-	2.5	YES	SW	188	154	134	96	16	4.5	312	-	YES	-	27.9	SPoon	
FILET MIGNON	F	21	21-2	421	170.0	401	YES	-	-	-	-	-	3.9	NO	SW	586	8	363	126	44	37.1	357	-	YES	-	27.9	KNIFE	
PRE-BUTTERED ROLL	F	24	24-2	430	53.0	401	YES	-	-	-	-	-	0.5	NO	PI	51	36	58	335	10	4.2	220	-	YES	-	YES	27.9	KNIFE
PORK LOIN W/DRESSING	F	26	26-2	431	200.0	401	YES	-	-	-	-	-	4.5	NO	SW	374	42	197	570	30	22.2	404	-	YES	-	YES	27.9	KNIFE
COFFEE CAKE	F	31	31-2	434	64.0	401	YES	-	-	-	-	-	0.4	NO	PI	89	43	67	253	13	5.0	243	-	YES	YES	YES	27.9	KNIFE
LOBSTER NEWBURG	F	39	39-2	442	200.0	401	YES	-	-	-	-	-	5.1	NO	SW	328	241	358	893	43	23.2	282	-	YES	-	YES	27.9	FORK
PRIME RIB	F	68	68-2	470	170.0	401	YES	-	-	-	-	-	3.8	NO	SW	484	11	343	246	37	41.7	381	-	YES	-	YES	27.9	KNIFE

*CAN BE PREPARED AT PREVIOUS MEAL, ONLY IF COLD WATER IS USED, AND THEN HEATED BEFORE EATING.

★ SW	- SWIFT
E	- EVANSVILLE FREEZE-DR
WPC	- WHIRLPOOL CORP
RI	- RICHARDSON
PI	- PILLSBURY
BR	- BRACH
FL	- FRANKLIN
KE	- KEEBLER
N	- NATICK

① REHYDRATABLE SPOONBOWL PACKAGE

② PACKAGE WEIGHT = WEIGHT OF CAN + LID PANEL + PACKAGING + PLASTIC LID + 3 TISSUE

FOLDOUT FRAME

FOLDOUT FRAME 2

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APPENDIX C
FOOD STOWAGE MATRIX

Food Stowage Matrix

This matrix outlines and defines data relative to the Food System Hardware as stowed on the Spacecraft. The matrix, consists of each stowage list line item with a series of information columns relative to each. A definition of each column is given below:

Stowage List No. - The item number listed in the Skylab Stowage list.

Quantity - Number of like items stowed on the Spacecraft.

Item - Item name.

Part Number - Self explanatory

Serial Number - Actual flight item serial number.

Weight - Stowed weight

Dimensions - Item dimensional envelope.

Vehicle Stowage Location - Stowage locker number.

Nominal Use Time - Approximate use rate on expendable items.

Vehicle Interface - How items are attached to the Spacecraft.

Backup - Quantity and location of backup items.

Use Sequence - Sequence of flight use of assemblies.

Assembly Contents - Number of sub-assemblies in item.

FOOD SYSTEM HARDWARE UTILIZATION AND STOWAGE MATRIX

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APPENDIX D
CANISTER USAGE CALCULATION

OVERAGE CALCULATION

	<u>Large Canisters</u>	<u>Wafer Canisters</u>	<u>Pudding Canisters</u>	<u>Beverage Canisters</u>
SL/2	43 + (11R*)	19 + (5R)	5 + (5R)	53 + 13"*
SL/3	102 + (10R)	65 + (7R)	21	96 + 8 1/2"*
SL/4	96	40 + (3R)	13 + (2R)	127 + 6"*
	<hr/>	<hr/>	<hr/>	<hr/>
	242 + 9R	125 + (3R)	40	278
OWS Stowage	(Large Canisters	242 + 9 Cans	
	(Small Canisters	443 + 3 Wafer Cans	
	(
	<u>Total Available</u>	<u>Required</u>	<u>Overage</u>	
Large	264	-	242 + 9 Cans =	21 + 3 Cans
Small	462	-	443 + 3 Wafer Cans =	18 + 9 Wafer Cans

Parentheses indicate number of cans in next canister.

*Stack height of beverages in next canister.

APPENDIX E
SKYLAB OVERAGE ANALYSIS

SKYLAB OVERAGE ANALYSIS

<u>Food Item</u>	<u>Overage</u>	<u>Canister</u>	<u>Per Item</u>	<u>Totals</u>
	<u>Qty</u>	<u>Size</u>	<u>Cal.</u>	<u>Cal.</u>
			<u>Protein (g)</u>	<u>Protein (g)</u>
Beverage				
Apple Drink	42	Small	144	0.0
Cherry Drink	21	Small	143	0.0
Lemonade	32	Small	84	0.0
Coffee	61	Small	11	0.5
				6084 0.0
Grape Drink	33	Small	123	0.0
Tea w/Lemon and sugar	17	Small	80	0.0
Strawberry Drink	17	Small	126	0.0
Cocoa	3	Small	259	3.9
				1360 0.0
Instant Breakfast	2	Small	239	14.8
Grapefruit Drink	11	Small	170	0.0
Orange Drink	8	Small	123	0.0
Coffee w/Sugar	24	Small	51	0.5
				1224 12.0
	<u>271</u>			
Pudding				
Lemon Pudding	7	Small	200	0.0
Butterscotch	14	Small	205	3.2
				1400 0.0
	<u>21</u>			
Wafer				
Hard Candy	24	Small	242	0.0
Peanuts	18	Small	303	13.4
Mints	24	Small	146	0.0
Butter Cookies	192	Small	160	1.4
				5808 0.0
Biscuit	24	Small	754	1.0
Vanilla Wafers	24	Small	114	1.5
Fruit Jam	12	Small	82	0.0
				241.2 3504 0.0
Dried Apricots	14	Small	183	2.2
Peanut Butter	12	Small	283	11.1
Tuna Salad	10	Small	149	9.7
				2562 3396 133.2
	<u>354</u>			
Large				
Sausage Patties	9	Large	197	16.4
Corn Flakes	4	Large	168	4.9
Scrambled Eggs	19	Large	235	11.6
Rice Krispies	7	Large	145	5.3
				4465 220.4 1015 37.1
Macroni & Chesse	9	Large	213	7.8
Salmon Salad	9	Large	312	23.5
				1917 2808 211.5

SKYLAB OVERAGE ANALYSIS (continued)

<u>Food Item</u>	<u>Overage Qty</u>	<u>Canister Size</u>	<u>Per Cal.</u>	<u>Item Protein (g)</u>	<u>Totals</u>	
					<u>Cal.</u>	<u>Protein (g)</u>
Shrimp Cocktail	15	Large	93	12.7	1395	190.5
Chicken & Rice	9	Large	239	17.3	2151	155.7
Pork & Potatoes	19	Large	187	13.4	3553	254.6
Beef Hash	7	Large	250	27.0	1750	189.0
Spaghetti & Meat	10	Large	241	21.6	2410	216.0
Chicken & Gravy	6	Large	166	16.5	996	99.0
Veal & Barbecue	9	Large	234	30.5	2106	274.5
Asparagus	9	Large	37	2.9	333	26.1
Green Beans	19	Large	89	2.9	1691	55.1
Mashed Potatoes	19	Large	200	3.4	3800	64.6
German Potato Salad	4	Large	176	6.8	704	27.2
Creamed Peas	4	Large	154	5.6	616	22.4
Mashed Sweet Potatoes	4	Large	216	2.8	864	11.2
Cream Style Corn	19	Large	159	3.4	3021	64.6
Pea Soup	2	Large	180	7.0	360	14.0
Turkey Rice Soup	17	Large	110	10.7	1870	181.9
Stewed Tomatoes	4	Large	65	1.8	260	7.2
Strawberries	23	Large	95	0.6	2185	13.8
Peach Ambrosia	14	Large	204	2.1	2856	29.4
Potato Soup	6	Large	231	2.9	1386	17.4
Bread	19	Large	141	3.3	2679	62.7
Peaches	25	Large	163	0.0	4075	0.0
Applesauce	25	Large	154	0.0	3850	0.0
Pears	15	Large	167	0.0	2505	0.0
Pineapple	10	Large	148	0.0	1480	0.0
Turkey & Gravy	5	Large	278	38.7	1390	193.5
	375					
Frozen						
Filet Mignon	9	Large	357	37.1	3213	333.9
Ice Cream	9	Large	312	4.5	2808	40.5
	18					
			9,990	408.2	156,481	1,210.8

Average per crewman per day*

414 11.1

*Based on 126 Mission Days.

APPENDIX F
SKYLAB STOWAGE & ORIENTATION LIST

SKYLAB STOWAGE AND ORIENTATION LIST

The baseline flight menus were used to construct a Skylab Stowage and Orientation List. This list will provide the exact stowage location of all food provided for all three Skylab missions and will be used by Whirlpool Corporation (WPC) to pack the food for in-flight stowage.

The orientation and stowage list will include stowage of the following:

Ambient Food Stowage

22 Restraint Assemblies
264 Large Food Canisters
462 Small Food Canisters

Frozen Food Stowage

5 Restraint Assemblies
50 Large Food Canisters

This OWS stowage list includes 387 total man/days of ambient food which will provide for the following days:

SL/2 - Mission Days 5-29 (A)
SL/3 - Mission Days 5-57 (A)
SL/4 - Mission Days 5-57 (A)

The frozen food stowage is the same except in addition to the days listed above, the CSM-transferred food is supplemented with frozen food on Mission Day 4 of SL/3 and SL/4. The stowage list for the CSM will be constructed later.

In order to construct this stowage list, menus had to be broken down into sequential listings of the food items in the order of usage. This sequential ordering was completed

for each crewman's menu and grouped by crew with the Commander (CDR) first, Scientist-Pilot (SPT) second, and Pilot (PLT) third. During this process the food items were divided into five groups for stowage: large cans, wafer cans, puddings, beverages, and frozen items. Within each ambient food restraint assembly, the twenty-one small canisters had to be divided among wafer items, puddings, and beverages without mixing can sizes in a given canister.

The following constraints were followed in constructing the stowage list:

- 1) Menus are based on a six-day cycle
- 2) Physical limitations included:
 - 1) Twelve ambient, large food cans per canister
 - 2) Seven puddings per small canister
 - 3) Twelve wafer cans per canister
 - 4) Twelve frozen cans per canister
 - 5) Beverage stack height not to exceed 15.5 inches
 - 6) Each frozen food restraint assembly will hold 10 canisters of frozen food
 - 7) Each ambient restraint will hold 12 large canisters and 21 small canisters of food
 - 8) Restraints 1-4 were assigned to SL/2
Restraints 5-13 were assigned to SL/3
Restraints 14-22 were assigned to SL/4

- 9) All crewmen should require a transfer of the next restraint assembly on approximately the same day and at the same meal
- 10) All overage should be put in odd numbered restraint assemblies for accessibility (odd numbered restraints are in the front of food lockers)
- 11) Meals could not be divided between frozen restraint assemblies

Canister No.	FOOD ITEM	DAY	MEAL	SOUP	CREWMAN	SERIAL NO.	INSP. STAMP
1 (RED) MEALS	SCRAMBLED EGGS	5	A	R	CDR		
	PEARS	5	A	R	CDR		
	SALMON SALAD	5	B	R	CDR		
	BREAD	5	B	R	CDR		
	STEWED TOMATOES	5	C	R	CDR		
	ASPARAGUS	5	C	R	CDR		
	PINEAPPLE	5	C	R	CDR		
	SCRAMBLED EGGS	6	A	R	CDR		
	PEACHES	6	A	R	CDR		
	CHICKEN & RICE	6	B	R	CDR		

2 (RED) MEALS	GERMAN POTATO SALAD	6	C	R	CDR		
	STRAWBERRIES	6	C	R	CDR		
	SCRAMBLED EGGS	7	A	R	CDR		
	STRAWBERRIES	7	A	R	CDR		
	PEA SOUP	7	B	R	CDR		
	CHICKEN & GRAVY	7	B	R	CDR		
	PEARS	7	B	R	CDR		
	VEAL & BBQ SAUCE	7	C	R	CDR		
	MASHED POTATOES	7	C	R	CDR		
	GREEN BEANS	7	C	R	CDR		
	HOT DOGS	8	B	R	CDR		
	CREAM CORN	8	B	R	CDR		

Locker No

Canister Type SMALL

Retainer Type Puddink

SL-3

Locker No. Canister Type SMALLRetainer Type WAFER

S/L 2

Canister No.	FOOD ITEM	DAY	MEAL	CO LDR	CREWMAN	SERIAL NO.	INSPE STAMP
(RED) MEAL (RED)	BACON WAFERS	5	A	R	CDR		
	APRICOTS	5	S	R	CDR		
	CATSUP	6	C	R	CDR		
	APRICOTS	6	S	R	CDR		
	BISCUIT	7	A	R	CDR		
	JAM	7	A	R	CDR		
	BISCUIT	7	B	R	CDR		
	PEANUTS	7	S	R	CDR		
	APRICOTS	8	S	R	CDR		
	JAM	9	A	R	CDR		
	BISCUIT	9	B	R	CDR		
	APRICOTS	9	S	R	CDR		

12 (RED) MEAL (Yellow) MEALS (Yellow)	BISCUIT	10	B	R	CDR		
	APRICOTS	10	S	R	CDR		
	BACON WAFER	11	A	R	CDR		
	CATSUP	5	B	Y	SPT		
	BUTTER COOKIES	5	S	Y	SPT		
	APRICOTS	5	S	Y	SPT		
	CATSUP	6	A	Y	SPT		
	PEANUT BUTTER	6	B	Y	SPT		
	JAM	6	B	Y	SPT		
	APRICOTS	6	S	Y	SPT		
	BUTTER COOKIES	6	S	Y	SPT		
	CATSUP	7	C	Y	SPT		36<

Locker No _____

Canister Type SMALLRetainer Type WAFER / BEVERAGE

Canister No.	Food Item	Day	Meal	Time	Crewman	Serial No.	Insp. Stamp
(BLUE) MEALS	BUTTER COOKIES	7	S	B	PLT		
	BACON WAFERS	8	A	B	PLT		
	PEANUT BUTTER	8	B	B	PLT		
	JAM	8	B	B	PLT		
	BISCUIT	8	B	B	PLT		
	APRICOTS	8	S	G	PLT		
	JAM	9	A	C	PLT		
	APRICOTS	9	S	C	PLT		
	BUTTER COOKIES	9	S	B	PLT		
	BACON WAFERS	10	A	B	PLT		
	BISCUIT	10	B	B	PLT		
	VANILLA WAFERS	10	S	B	PLT		

(RED) BEVERAGES	COFFEE WITH SUGAR	5	A	R	CDR		
	GRAPEFRUIT	5	B	R	CDR		
	ORANGE	5	C	R	CDR		
	GRAPEFRUIT	5	S	R	CDR		
	COFFEE W/SUGAR	5	S	R	CDR		
	COFFEE W/SUGAR	6	A	R	CDR		
	GRAPEFRUIT	6	B	R	CDR		

Locker No.

Canister Type SMALL

Retainer Type BEVEL A

SL-3

APPENDIX G
SKYLAB FOOD TRANSFER SCHEDULE

Skylab Food Transfer Schedule

	<u>Restraint</u>	<u>Day*</u>	<u>Meal*</u>
SL-2	1	5	A
	2	11	A
	3	17	C
	4	23	C
SL-3	5	5	A
	6	10	C
	7	16	C
	8	22	C
	9	28	C
	10	34	C
	11	40	C
	12	46	C
	13	52	C
	14	5	A
SL-4	15	10	B
	16	16	C
	17	22	C
	18	28	C
	19	34	C
	20	40	C
	21	46	C
	22	49	B

*The transfer must occur before this time to allow for preparation for next meal.

APPENDIX H
FOOD CONSUMPTION/MINERAL SUPPLEMENT REPORT

SKYLAB MISSION 3MISSION DAY 55MENU DAY 1DOY 263

FOOD CONSUMPTION/MINERAL SUPPLEMENT REPORT

	CDR		SPT		PLT		
	NO.	ITEM	NO.	ITEM	NO.	ITEM	
Items Included in Menus But Not Consumed	65	Corn	3	Tuna	3 75	Tuna Bread	
Overage Items Consumed	23 47	Lemonade Pears	42 5 47 59	Grape Drink Peanuts Pears Pork & Potatoes	5 69 76 66	Peanuts Peach Ambrosia Butter Cookies Tea	
Mineral Supplements	REQ'D.	TAKEN	REQ'D.	TAKEN	REQ'D.	TAKEN	TOTAL UNCONSUMED
Calcium							783
Phosphorus							780
Sodium		3					793
Magnesium		1					770
Potassium							771
Salt Packets		4		2		4	259

CDP
A

APPENDIX I
WEEKLY OVERAGE CHANGE REPORT

Thru Mission Day 17, DOY 161 DATE June 10, 1973

<u>NO.</u>	<u>ITEM</u>	<u>OVERAGE ITEMS CONSUMED</u>	<u>ITEMS NOT CONSUMED</u>	<u>NO.</u>	<u>ITEM</u>	<u>OVERAGE ITEMS CONSUMED</u>	<u>ITEMS NOT CONSUMED</u>
22	Asparagus			3	Tuna Salad Spread		
73	Greenbeans		1	74	Macaroni & Cheese	2	
32	Mashed Potatoes			25	Salmon Salad	1	
49	German Pot. Salad	2		34	Chili W/Meat		
56	Creamed Peas			51	Shrimp Cocktail		
61	Mashed Swet. Potatoes			55	Chicken & Rice		
64	Stewed Tomatoes			59	Pork & Scalloped Pot.		
65	Cream Style Corn		4	63	Beef Hash		
2	Butterscotch Pudding			67	Sliced Dried Beef		
4A	Lemon Pudding			72	Spaghetti & Meat Sauce		
7	Dried Apricots		2	40	Turkey & Gravy		
76	Butter Cookies	15		44	Hot Dogs W/Tomato Sauce		
27	Strawberries			57	Chicken & Gravy		
28	Vanilla Wafers			71	Veal & Barbecue Sauce		
38	Pineapple			12	Mints	1	
43	Applesauce			20	Catsup	4	
46	Peaches			36	Fruit Jam	1	
47	Pears			41	Hard Candy		
69	Peach Ambrosia			33	Peanut Butter	1	
				5	Dry Roasted Peanuts		
23	Lemonade		1	37	Pea Soup		
42	Grape Drink	1		45	Potato Soup		
58	Cocoa			53	Turkey Rice Soup		
60	Orange Drink		1	11	Cheddar Cheese Crackers		
62	Coffee			48	Biscuit		
66	Tea W/Lemon & Sugar		2	75	White Bread	7	
78	Cherry Drink			6	Vanilla Ics Cream		
77	Apple Drink			21	Filet Mignon		
80	Strawbrrry Drink			24	Pre-Buttered Roll		
79	Grapefruit Drink			26	Pork Loin W/Dressing		
50	Instant Breakfast			31	Coffee Cake		
81	Coffee W/Sugar		18	39	Lobster Newburg		
				68	Prime Rib		
13	Sausage Patties			17	Bacon Wafers		
16	Scrambled Eggs			54	Rice Krispies		
17	Bacon Wafers			15	Corn Flakes		

APPENDIX J
OVERAGE CALORIE DATA - END OF SL/2

OVERAGE CALORIE DATA

Item	Cal/Item	Used Items-Calorie Total	<u>OVERAGE</u>	
			Used	Added Items-Calorie Total
Asparagus	37		2 -	74
Potato Salad	176	2 - 352		
Corn	159		8 -	1272
Apricots	183		4 -	732
Butter Cookies	144	47 - 6768	1 -	144
Lemonade	84		1 -	84
Grape Drink	123	1 - 123		
Orange Drink	123		1 -	123
Tea	80		2 -	160
Apple Drink	144	1 - 144		
Coffee/sugar	51		34 -	1734
Macaroni & Cheese	213		3 -	639
Salmon Salad	312		4 -	1248
Chili w/Meat	473		3 -	1419
Mints	146		1 -	146
Fruit Jam	82	4 - 328	2 -	164
Peanut Butter	283	4 - 1132		
Biscuit	54		3 -	162
White Bread	141		17 -	2397
Filet Mignon	357	3 - 1071		
Butterscotch Pudding	205		1 -	205
Lemon Pudding	200		1 -	200
Peach Ambrosia	204		2 -	204
Peanuts	303		2 -	606
TOTAL		9918		11, 713

Additional calories available from SL/2 - 1795

Overage calories available at beginning of mission - 156,481

Overage calories available for SL/3 and SL/4 - 158,276

APPENDIX K

SL/3 LAUNCHED FOOD

FOOD LAUNCHED ON SL/3

The food listed below was launched on SL/3 for use in the 3-day extension of the SL/3 mission. All other food items required for the extension were available on the Skylab OWS.

<u>Food Item</u>	<u>Quantity</u>	<u>Serial Numbers</u>
Bacon Wafers	2	BAC 728 BAC 682
Orange Drink	6	BFJ 1004 BFJ 1046 BFJ 1033 BFJ 1021 BFJ 1013 BFJ 1007
Instant Breakfast	3	BEI 019 BEI 232 BEI 238
German Potato Salad	1	BDI 0470
Dried Beef	1	BFG 062

APPENDIX L
3-DAY EXTENSION FOOD LOCATIONS

3-DAY EXTENSION FOOD LOCATIONS

<u>ITEM</u>	<u>NO. REQ'D.</u>	<u>OVERAGE LOCATION</u>	<u>CANISTER NO.</u>	<u>LABEL</u>
Applesauce	1	F550		
Asparagus	2	F550		
Biscuit	10	F550		
	5	F559 Front	32	
Bread	9	F550		
Butterscotch Pudding	1	F550		
	4	F548	G2-01	
Chicken & Gravy	2	F563 Front	28	
Chicken & Rice	2	F559 Front	33	
Chili w/meat	1	F550		
Cocoa	1	F550		
	1	F556 Front	32	
Creamed Peas	1	F559 Front	28	
Corn	7	F550		
Dried Apricots	4	F550		
	3	F548	G1-07	
Filet Mignon	6	W755		
Fruit Jam	2	F550		
	2	F548	G1-08	
G. Potato Salad	1	F548	C1-04	
Grape Drink	4	F550		
Grapefruit Drink	1	F550		
	1	F560 Front	11	
Greenbeans	3	F548	C1-03	
Instant Breakfast	1	F559 Front		
Lemon Pudding	3	F550		
	1	F563 Front	5	
Lemonade	4	F550		
	2	F560 Front	16	
	1	F560 Front	19	
	1	F560 Front	25	
	1	F560 Front	27	
Macaroni & Cheese	1	F550		
Mashed Potatoes	3	F550		

<u>ITEM</u>	<u>NO. REQ'D.</u>	<u>OVERAGE LOCATION</u>	<u>CANISTER NO.</u>	<u>LABEL</u>
Orange Drink	1	F550		
	8	F548		
Pea Soup	2	F557 Rear	G2-11	33
Peach Ambrosia	1	F548	Cl-07	
Peaches	3	F550		
Peanut Butter	2	F548	Gl-9	
Pears	1	F559 Front		23
Pineapple	2	F559 Front		33
Potato Soup	2	F550		
Rice Krispies	1	F550		
	1	F560 Front		28
Sausage Patties	3	F548	Cl-10	
Scrambled Eggs	6	F550		
Shrimp Cocktail	2	F548	Cl-10	
Spaghetti	2	F548	Cl-01	
Strawberries	6	F548	Cl-06	
Strawberry Drink	2	F55C		
Tuna Spread	5	F548	G2-12	
Turkey & Gravy	2	F559 Front		23
Turkey Rice Soup	1	F550		
Vanilla Ice Cream	2	W756		10
	3	F553		10
Vanilla Wafers	6	F559 Front		30
Veal & BBQ	1	F548	Cl-02	

57
A

APPENDIX M

SL/IV STOWAGE LIST

<u>FOOD PKG.</u>	<u>LOC.</u>	<u>P/N</u>	<u>S/N</u>	<u>WT.</u>	<u>CONTENTS</u>
1	A7			23.3 Total	
		24-02032-03	6144	3.94 lbs.	DAY 1 MEAL B
		24-02033-03	6145	5.1 lbs.	DAY 1 MEAL C
		118-MFS-038	N/A	3.61	CM Food (2A)
		SEBT13100218-301	2001	.61	Food Sticks
			2004		
			2005		
			2010		
		SEC39108329-301	1010	.23	Iodine Tablets
		24-02035-01		.31	Spoons
		14-02092		.10	Water Bag
		DE5-Food/1		.74	Vitamins (5 ea)
		TPS15320018	1002	2.01	Salt Kit
		SEC39109343-301	1004	2.15	Catsup
		TPS15320021	1001	.31	Taste Kit
		TPS15320020	1001	2.58	Spice Kit
				1.42	M071/M073 Bag
2	A9	GE-TPS-C-204	1002	33.2	Nominal CSM Day 2,3,4 H-D Day 2, Meal B & C
3	A1	GE-TPS-C-204	1001	16.08	RSB Spaghetti - 45 RSB Mashed Pot. - 21 RSB Veal & BBQ - 15 RSB Pork & Pot. - 21
4	A3	GE-TPS-C-204	1003	14.55	RSB Chicken & Rice - 18 RSB Chicken & Gravy - 63 RSB Pork & Pot. - 22
5	A4	GE-TPS-C-205	1001	20.94	Veal & BBQ - 11 Salmon Salad - 5 Chicken & Rice - 1 Pork & Pot. - 1 Sausage - 36 Mashed Pot. - 18 Apricots - 18 Grapefruit Dr. - 39
6	A5	GE-TPS-C-205	1002	49.83	Hi-Density Bars Flake - Vanilla - 34 Chocolate - 37 Rasberry - 10 Crispy - Vanilla - 60 Chocolate - 61 Rasberry - 14 Choc.Chip - Vanilla - 72 Chocolate - 72 Rasberry - 18

<u>FOOD PKG.</u>	<u>LOC.</u>	<u>P/N</u>	<u>S/N</u>	<u>WT.</u>	<u>CONTENTS</u>
7	A6	GE-TPS-C-205	1003	24.02	Spaghetti - 9 RSB Spaghetti - 5 Chicken & Gravy - 9 Sausage Patties - 10 Mashed Pot. - 3 Beef Hash - 4 Apollo Cocoa - 34 Peanuts - 20 Apricots - 14 Peanut Butter - 2 Bacon - 9 Salmon Salad - 11 Veal & BBQ - 1 Apollo Grape Punch - 9 Apollo Grape Drink - 18 Apollo Grapefruit Dr. - 2
In L3		24-02037-03	6146	4.3	Return Meal A Delta & Return Meal B
In B1		TPS 118-MFS-053		8.24	Lemonade - 15 Jam - 5 Peanuts - 4 Apricots - 10 Grapefruit Dr. - 25 Orange Dr. - 3
In A9		TPS 118-MFS-062		12.0	Lemonade - 27 Grape Dr. - 21 Tea - 28 Apple Dr. - 10 Cherry Dr. - 10
In A7		T-41038		21.39	Survival Bars - 120

APPENDIX N

SKYLAB IV FOOD INVENTORY THRU MISSION DAY 53

SKYLAB FOOD INVENTORY THRU MISSION DAY 53

FOOD NO.	FOOD ITEM	INITIAL QUANTITY	QUANTITY REQUIRED FOR MENUS	QUANTITY REMAINING	EXCESS + - SHORTAGE
77	Apple Drink	10		2	+2
43	Applesauce	36	13	15	+2
22	Asparagus	94	22	54	+32
17	Bacon Wafers	45	18	19	+1
63	Beef Hash	29	11	11	
48	Biscuit	210	86	94	+8
62	Black Coffee	248	97	97	
75	Bread	169	87	87	
76	Butter Cookies	90	21	44	+23
2	Butterscotch Pudding	69	28	28	
20	Catsup	50	9	32	+23
78	Cherry Drink	10		2	+2
57	Chicken and Gravy	103	37	37	
55	Chicken and Rice	27	11	11	
34	Chili with Meat	30	13	13	
58	Cocoa	2			
31	Coffee Cake	17	7	7	
81	Coffee with Sugar	205	79	89	+10
56	Creamed Peas	41	21	22	+1
65	Cream Style Corn	65	29	29	
7	Dried Apricots	92	37	38	+1
5	Dry Roasted Peanuts	68	28	28	
21	Filet Mignon	43	17	17	
36	Fruit Jam	80	33	35	+2
49	German Potato Salad	39	18	18	
42	Grape Drink	106	31	45	+14

SKYLAB FOOD INVENTORY THRU MISSION DAY 53

FOOD NO.	FOOD ITEM	INITIAL QUANTITY	QUANTITY REQUIRED FOR MENUS	QUANTITY REMAINING	EXCESS + - SHORTAGE
79	Grapefruit Drink	134	53	53	
73	Green Beans	72	40	43	+3
41	Hard Candy	7	1	2	+1
44	Hot Dog				
50	Instant Breakfast	18	7	7	
4A	Lemon Pudding	60	27	29	+2
23	Lemonade	131	40	66	+26
39	Lobster Newburg	18	6	6	
74	Macaroni and Cheese	37	17	18	+1
32	Mashed Potatoes	78	31	31	
61	Mashed Sweet Potatoes	4	1	1	
12	Mints	26	10	7	-3
60	Orange Drink	235	91	93	+2
37	Pea Soup	11	5	5	
69	Peach Ambrosia	35	11	19	+8
46	Peaches	70	24	32	+8
33	Peanut Butter	28	12	12	
47	Pears	73	27	30	+3
38	Pineapple	30	13	13	
59	Pork & Scalloped Potatoes	63	25	26	+1
26	Pork Loin with Dressing	33	11	11	
45	Potato Soup	20	9	9	
24	Pre-Buttered Roll	8	3	3	
68	Prime Rib	44	18	18	
54	Rice Krispies	50	28	28	58<
25	Salmon Salad	44	11	11	

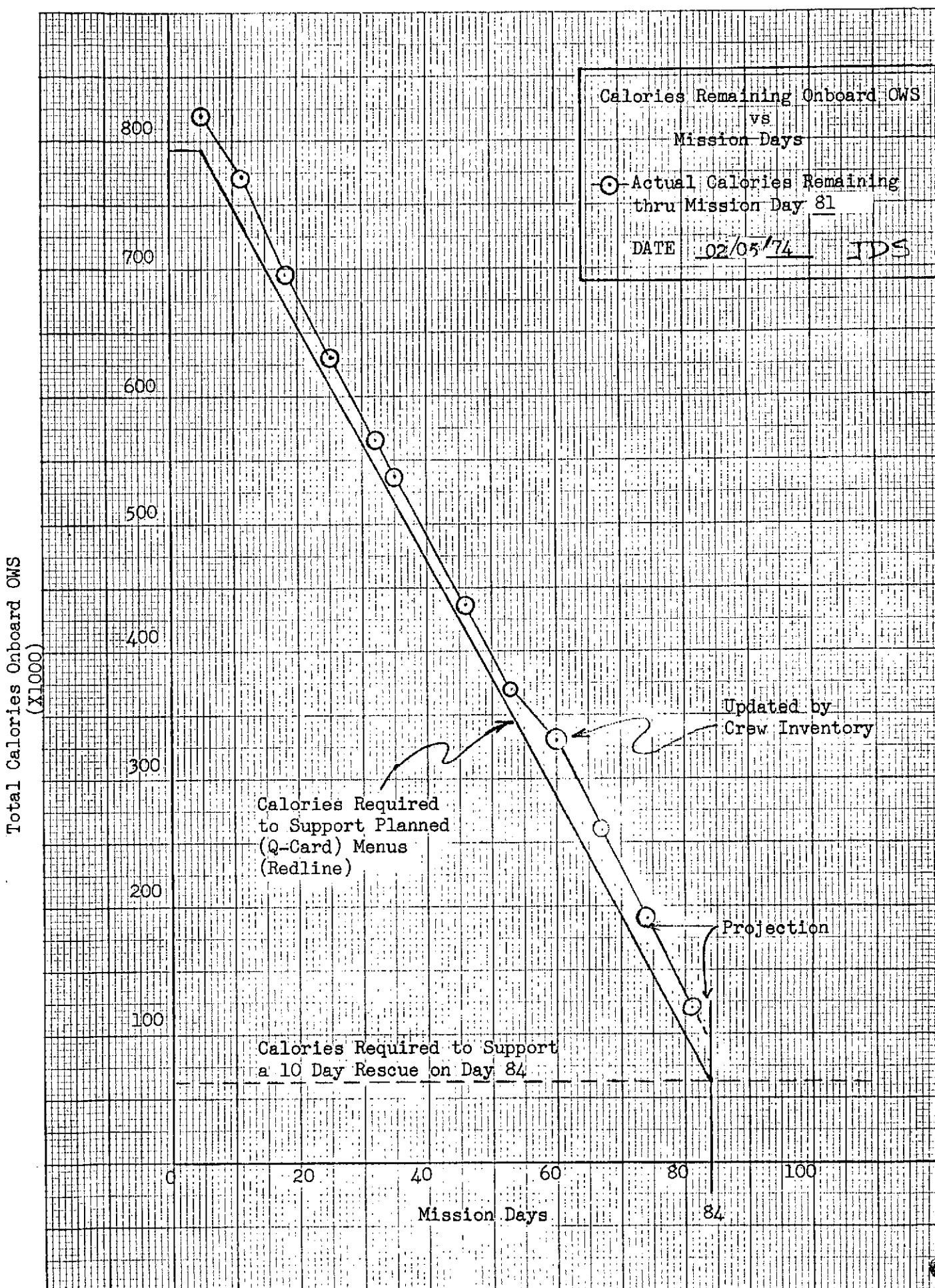
SKYLAB FOOD INVENTORY THRU MISSION DAY 53

FOOD NO.	FOOD ITEM	INITIAL QUANTITY	QUANTITY REQUIRED FOR MENUS	QUANTITY REMAINING	EXCESS + - SHORTAGE
13	Sausage Patties	134	61	62	+1
16	Scrambled Eggs	101	39	40	+1
51	Shrimp Cocktail	65	34	34	
67	Sliced Dried Beef	19	8	8	
72	Spaghetti with Meat Sauce	79	35	35	
64	Stewed Tomatoes	55	24	25	+1
27	Strawberries	65	31	31	
80	Strawberry Drink	34	14	14	
15	Sugar Coated Corn Flakes	37	15	15	
66	Tea w/Lemon and Sugar	200	64	81	+17
3	Tuna Sandwich Spread	44	4	32	+28
40	Turkey and Gravy	31	12	13	+1
53	Turkey Rice Soup	35	18	19	+1
6	Vanilla Ice Cream	81	32	32	
28	Vanilla Wafers	40	14	18	+4
71	Veal & Barbecue Sauce	59	29	30	+1
	Grapefruit Drink (A)	2	0	0	
	Grape Punch (A)	9	6	6	
	Grape Drink (A)	18	12	11	-1
	Cocoa (A)	34	16	16	
	Crispy Bar	135	51	51	
	Flake Bar	81	31	31	
	Chocolate Chip	162	62	64	+2
	Survival Bar	120	0	120	+120
	CSM Day 1 Meal B	3	0	0	
	CSM Day 1 Meal C	3	0	0	

SKYLAB FOOD INVENTORY THRU MISSION DAY 53

APPENDIX O
CALORIES REMAINING ONBOARD OWS
VS
MISSION DAYS

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APPENDIX P
OWS FINAL FOOD INVENTORY

OWS FINAL FOOD INVENTORY

<u>Food Item</u>	<u>Quantity</u>
Applesauce	2
Asparagus	28
Beef Hash	5
Biscuit	1
Bread	23
Butterscotch Pudding	2
Catsup	22
Chicken and Gravy	2
Coffee with Sugar	18
Creamed Peas	7
Cream Style Corn	24
German Potato Salad	2
Grape Drink	10
Grapefruit Drink	0
Green Beans	12
Lemonade	16
Macaroni and Cheese	1
Mashed Sweet Potatoes	3
Pea Soup	1
Peach Ambrosia	5
Peaches	1
Pears	1
Pineapple	1
Pork & Scalloped Potatoes	1
Potato Soup	1
Rice Krispies	1
Scrambled Eggs	1
Shrimp Cocktail	11
Sliced Dried Beef	1
Spaghetti with Meat Sauce	3
Stewed Tomatoes	2
Sugar Coated Corn Flakes	1
Tea w/lemon and sugar	5
Tuna Sandwich Spread	13
Turkey and Gravy	1
Turkey Rice Soup	5
Veal & Barbecue Sauce	8
Grape Drink (A)	1
Survival Bar	120